



## **NASA SBIR 2008 Phase I Solicitation**

### **O4.03 Lunar Surface Navigation**

**Lead Center: GRC**

**Participating Center(s): JSC**

In order to provide location awareness, precision position fixing, best heading and traverse path planning for planetary EVA, manned rovers and lunar surface mobility units NASA has established requirements for organic navigation capabilities for surface-mobile elements of lunar missions. This topic will develop systems, technologies and analysis in support of the required capabilities of lunar surface mobility elements. Contemplated navigation systems could employ celestial references, passive or active optical information such as optical flow or range to local terrain features, inertial sensor information or other location-specific sensed data or combinations thereof. However, radiometric measurements are considered to be concomitant to the lunar communications network and the lunar network will likely be used to communicate state information between lunar mission elements. As such, the main emphasis of this topic is on systems that exploit radiometric measurements such as range, Doppler or Angle of Arrival. Radiometric measurements can be considered between lunar mission elements such as surface mobility units, elements of a lunar surface architecture (such as surface landers or habitation units or other surface mobility units) or elements of the lunar communications and navigation infrastructure such as surface communications towers or lunar communication/navigation orbiters. Earth-based nodes are not excluded from consideration, nor are two-way radiometric measurements, nor are non-NASA-standard (e.g. UWB) modulation schemes. Traverse-path planning systems and navigation-specific displays are also of interest.

Emphasis of the development is on navigation accuracy, Size Weight and Power (SWaP), systems that operate effectively with minimal communications/navigation infrastructure (such as towers or orbiters) or with complete autonomy, with minimal crew involvement or completely automatically. Unified concepts and systems that provide a range of hardware capabilities (possibly trading accuracy with SWaP) are of interest. Mature system concepts and technologies including system demonstration with TRL 6 components and internalized (by NASA) standards are required at the end of a Phase 2.

Research should be conducted to demonstrate technical feasibility during Phase 1 and show a path toward Phase 2 hardware and software demonstration and delivering a demonstration unit or software package for NASA testing at the completion of the Phase 2 contract.